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An Extended Dataset of River Discharges for Validation of General Circulation Models

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Using existing measurements of streamflow data, we present a new dataset of river discharges to the ocean, for use in validating general circulation models. This dataset includes annual mean discharges for 981 rivers, representing approximately $821,762 \text{ m}^3/\text{s}$ of global river discharge. We find that rivers with annual mean discharges between about $250 \text{ m}^3/\text{s}$ and $20,000 \text{ m}^3/\text{s}$ closely follow a power-law size distribution. Using our new dataset, we present a self-consistent water budget over continents. The total discharge of all the rivers in our dataset is about 65% of contemporary estimates of continental precipitation minus continental evaporation (P-E). We estimate that rivers with discharges less than $250 \text{ m}^3/\text{s}$, which are largely missing from our dataset, have a total flow equal to about 25% of P-E. This estimate is made by extrapolating the observed size distribution of rivers with flow greater than $250 \text{ m}^3/\text{s}$. Including an existing estimate of underground discharge to the ocean, our estimated total flow into the ocean including all above- and below-ground sources is within about 6% of contemporary estimates of continental P-E. Our dataset is available in digital format from the authors.

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1. 1995 Fall Meeting

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4. H

5. (a)
(b) 1655 Water cycles, 1860
Runoff & streamflow, 1836
Hydrologic Budget
(c) Climate and Global
Change

6. N/A

7. 0%

8. P.O.#

9. C

10. N/A

11 No